UNEP

3 Editorial
Klaus Toepfer, Executive Director, UNEP

4 World Environment Day
Margot Wallström, EU Commissioner for the Environment

5 Water is life
HRH Prince Talal Bin Abdul Aziz Al Saud, UNESCO's Special Envoy for Water

7 The water century
Ryutaro Hashimoto, Chairman, National Japanese Steering Committee, World Water Forum

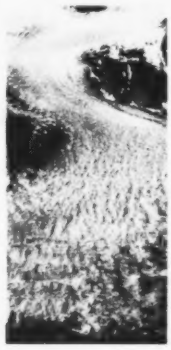
Scott Nielsen/UNEP/Topham

9 Taking it at the flood
Wang Shucheng, Minister of Water Resources, People's Republic of China

Tarlok Chawla/UNEP/Topham

11 Renewing the commitment
Paula J. Dobriansky, United States Under Secretary of State for Global Affairs

13 Waterless cities
Anna Kajumulo Tibaijuka, Under-Secretary-General, United Nations; Executive Director, UN-HABITAT



Kelly Vandeberg/UNEP/Topham

15 Keeping pollution at bay
Wayne Gilchrest, Chairman, Resources Subcommittee on Fisheries Conservation, Wildlife and Oceans, US House of Representatives

17 People

18 At a glance: The world's water crisis

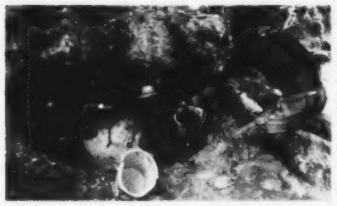
20 Changing agenda
Richard Jolly, Chair, WSSCC

22 Nor any drop to drink
Ashok Khosla, President, Development Alternatives

24 Bridging troubled waters
Pekka Haavisto, Chairman, UNEP's Desk Study on the Occupied Palestinian Territories

25 Books & products

26 Getting there
Ravi Narayanan, Director, WaterAid



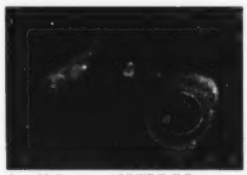
Chris Heller/UNEP/Still Pictures

28 Sinking fast
Jonathan Loh, Editor, WWF's Living Planet Report*; Lisa Hadeed, Communications Manager, WWF International*

29 Waste not
Polly Ghazi, Senior Correspondent Green Futures

31 Water – the poor's priority
Shabana Azmi, actor

32 Atomic power
Marina Mansilla Hermann, Student of Environmental Science, Argentina



Jozsef L. Szentpeteri/UNEP/Still Pictures

Our **Planet**,
the magazine of the
United Nations Environment Programme (UNEP)
PO Box 30552, Nairobi, Kenya
Tel: (2542) 621 234; fax 623 927; telex 22068 UNEP KE
e-mail: cpinfo@unep.org
www.unep.org

ISSN 1013-7394

Director of Publication: Eric Falt
Editor: Geoffrey Lean
Coordinator: Naomi Poulton
Special Contributor: Nick Nuttall
Circulation Manager: Manyahleshal Kebede
Design: Roger Whisker
Web Editor: Chris Cypert
Production: Banson
Printed in the United Kingdom

Front cover: Jon Layne/UNEP/Topham

The contents of this magazine do not necessarily reflect the views or policies of UNEP or the editors, nor are they an official record. The designations employed and the presentation do not imply the expression of any opinion whatsoever on the part of UNEP concerning the legal status of any country, territory or city or its authority, or concerning the delimitation of its frontiers or boundaries.

The non-copyrighted contents of this magazine may be reprinted without charge provided that ***Our Planet*** and the author or photographer concerned are credited as the source and the editors are notified in writing and sent a voucher copy.

Our Planet welcomes articles, reviews, illustrations and photos for publication but cannot guarantee that they will be published. Unsolicited manuscripts, photographs and artwork will not be returned.

Subscriptions: If you wish to receive ***Our Planet*** on a regular basis and are not currently on the mailing list, please contact Manyahleshal Kebede, Circulation Manager, ***Our Planet***, for subscription details, giving your name and address and your preferred language (English, French or Spanish).

Change of address: please send your address label together with your new address to: Manyahleshal Kebede, Circulation Manager, ***Our Planet***, UNEP, PO Box 30552, Nairobi, Kenya.

This magazine is printed using vegetable based-inks on paper made from 100 per cent recycled waste material. It is bleached without any damage to the environment.

UNEP

From the desk of

KLAUS TOEPFER

United Nations Under-Secretary-General and Executive Director, UNEP

It may seem curious to celebrate a tiny piece of rubber, smaller than a US quarter, found in bathroom taps and kitchen faucets around the globe. But the humble washer is one of a range of low-tech devices with a big part to play in reducing losses of water, that most fundamental natural resource on which all life depends.

A leaky tap, dripping every second, may seem like a drop in the ocean, but it wastes well over 4 litres a day. Over a month, a seriously leaking tap can lose as much as 10,500 litres.

Taking action

Fixing taps is just one action we can all take to conserve water for the sake of communities and wildlife habitats alike. Simple, thoughtful measures, across homes, communities, work-places, industries and cities could really make a difference.

UNEP's International Environmental Technology Centre in Osaka, Japan, is compiling a database of water-saving tips, technologies and policies drawn from both the developed and developing world, including small island states.

Dual flush lavatories, in which either 10 or 5 litres are used depending on need, can save up to 15 litres a day. They may only be affordable in more developed nations. But bricks, milk jugs filled with pebbles, or similar 'toilet displacement devices' – as they are euphemistically called – cost little and, when placed in a conventional lavatory's water tank, can cut the flush by some 4 litres.

Showers account for some 20 per cent of a household's total in-door water use in a country like the United States. Installing low-flow showerheads has been calculated to save a family of four 80,000 litres of water a year.

As much as 600 litres can be saved when washing a car by turning off the hose between rinses, while washing it on the lawn, rather than the driveway, can save water needed to keep the grass green.

Some Pacific and Caribbean islands – such as Kiribati, Nauru, Saint Lucia and the Bahamas – have dual supply systems. Drinking water comes through one pipe while another brings in saltwater for the lavatory.

Rainwater harvesting is underutilized, but has huge potential in both the developing and developed worlds. The Ryogoku Kokugikan Sumo-wrestling arena in Sumida City, Japan, collects rainwater on its 8,400 square metre roof for lavatory flushing and air conditioning.

In China, 17 provinces have installed between 5 million and 6 million rainwater harvesting tanks supplying an estimated 15 million people with drinking water as well as providing back-up irrigation for over a million hectares of farmland. In some Nigerian homes, broad-leaved trees collect rainwater which then runs down a bamboo gutter into a pot.

Real conservation efforts are needed in agriculture, which uses up to 70 per cent of freshwater and wastes much of it. Simple and cheap drip technologies, using underground pipes, can dramatically reduce losses by such factors as evaporation. Indian researchers have claimed water savings of 60 per cent.

The database also cites case studies from countries, including developing ones, where water metering has been tried and leak detection adopted to reduce huge losses from water supply networks. Water consumption was cut by 43 per cent in Honiara, Solomon Islands, after the introduction of meters. In Malta, losses from pipes were cut from 55 per cent to 25 per cent following a leak detection programme.

In Chile, laws have encouraged a water market involving tradable and transferable rights. As a result, its farmers shift during droughts from growing water-intensive crops such as corn and oilseeds, to higher value ones, which need less water, like fruits and vegetables.

The font of life

Many of these practical steps are only possible if water is given value. This value may be economic, but it can also be cultural. Since the dawn of time – and often through the teachings of the world's great religions and beliefs – water has been revered and recognized as the font of all life.

This year's slogan for World Environment Day is 'Water: Two Billion People are Dying for It!'. It is incumbent on the 4 billion who are not, to renew their respect for water by valuing every drop ■

YOUR VIEWS

I would really like to receive your feedback on the issues raised in this edition of ***Our Planet****. Please either e-mail feedback@ourplanet.com or write to: Feedback, Our Planet, 27 Devonshire Road Cambridge CB1 2BH, United Kingdom*

WORLD ENVIRONMENT DAY MESSAGE

MARGOT WALLSTRÖM
EU COMMISSIONER FOR THE ENVIRONMENT

ACTIONS SPEAK
louder than words

We have come a long way since the 1972 United Nations Conference on the Human Environment, which put environmental concerns squarely on the international agenda. But while we have made some progress in improving and conserving our fragile environment, we have not yet succeeded in stopping environmental degradation for good, nor in finding the path to sustainable development. It is my conviction that these goals are attainable, but their accomplishment will require efforts by all of us: rich and poor, young and old, and in all corners of the globe.

World Environment Day embodies this approach, raising awareness, encouraging people to voice their thoughts and do their utmost to improve the environment. This year's World Environment Day is devoted to that invaluable resource, water, and it has my whole-hearted support.

Fresh water is a luxury – but most of us take it for granted. We do not realize that more than 1 billion people, one in six of the world's population, are without access to a safe water supply, nor that half the world's population lack adequate sanitation. This produces disease and death, particularly among children.

To make matters worse, global demand for water keeps growing, and resources are being used up faster than they can be replenished. It is imperative that we all learn how to save and share water, thus ensuring that less fortunate people around the world and the generations to come also have access to it. Turning off the tap while you brush your teeth, taking a shower instead of a bath, and other slight changes of daily habit that may seem insignificant can make a big difference.

I believe that World Environment Day should maintain the momentum of last year's Johannesburg World Summit on Sustainable Development and ensure that actions speak louder than words. One of the targets agreed at the Summit is, by 2015, to halve the proportion of people without access to basic sanitation. This complements the Millennium Development Goal – again by 2015 – of halving the proportion of people without sustainable access to safe drinking water.

In Johannesburg, the European Union launched the 'EU Water for Life Initiative' to reach these goals. The initiative's aim is to bring safe water and sanitation to the poorest regions of Africa and the Newly Independent States, in partnership with their governments and with an emphasis on capacity-building. Now the European Commission is taking the lead in trying to inject further momentum into this initiative, including through the mobilization of significant European Development Fund resources.

Another important result of Johannesburg is the agreement to establish a ten-year framework for programmes on sustainable consumption and production, with industrialized countries taking the lead in this global effort.

Now that the delegates have left Johannesburg, it is time for the real work to start – on converting all the words and brainwork into action. We need to ensure that the Johannesburg Implementation Plan is backed up by a concrete work programme, and thorough monitoring and reporting mechanisms, so that individual governments can be held accountable for their pledges. But we also need to do more to integrate sustainable development into our daily routines, not only within the borders of the European Union but also throughout the world. And as individuals, we can each make changes to our lifestyles, acting with real motivation and determination to preserve our environment.

This is the idea behind World Environment Day, which will play a vital role in mobilizing stakeholders at all levels. Civil society initiatives and partnerships between governments, international institutions and non-governmental organizations are important ways of implementing internationally agreed actions, and were recognized for the first time at United Nations level in Johannesburg. They can help ensure effective implementation of the Johannesburg commitments.

The European Commission plays its part in making sure World Environment Day gets the attention it deserves, by organizing each year a 'Green Week' and 'Green Days'. The theme of this year's Green Week (2-5 June in Brussels) is 'Changing Our Behaviour'. It will bring people together to debate, as a follow-up to Johannesburg, the key environmental issues of water, sustainable consumption and production, and renewable energy and climate change. Green Days (30 May-9 June) are locally organized events across Europe designed to mobilize local action in support of the Green Week goals.

I can only repeat: sustainable development will be achieved only if vigorous efforts are made at every level – starting with the individual and progressing from the local, to the regional, to the national, to the supranational, to the international – and only if these efforts are made in partnership with all the actors involved.

World Environment Day should motivate us to redouble our efforts ■

UNEP/Topham

WATER *is life*

HRH PRINCE TALAL BIN ABDUL AZIZ AL SAUD describes how the International Year of Freshwater provides an opportunity for governments and individuals to take stock of what they can do to resolve the global water crisis

Having been named by the Director General of the United Nations Educational, Scientific and Cultural Organization as Special Envoy for Water during this very special International Year of Freshwater, I feel a personal responsibility to mobilize awareness about the importance of caring for our freshwater resources if we are to ensure the well-being of societies everywhere. The message is a simple one.

Echoing the Director General's own words on the occasion of the Year's launching ceremony: 'For the sake of international peace, human security and sustainable development, we must be caring, sparing and sharing in all we do regarding freshwater. Let us now spread this message far and wide.'

Coming from Saudi Arabia, a desert kingdom with no perennial rivers, streams or permanent freshwater lakes, and where rainfall is both scarce and infrequent, I have a deep appreciation of the value of freshwater.

Not so long ago, when a traditional way of life prevailed in my country, small towns and nomadic societies were able to flourish here because they were well adapted to this water-scarce environment. They did not waste water and they did not consume more than they had. But today, this delicate demographic balance has shifted. In the wake of changing lifestyles and expectations, Saudi Arabia, like many other parts of the world, is experiencing stress.

Education, training and creative partnerships are assuming a central place in the effort to build a better and more secure future

Scarce resource

The increase in water demand due to population growth and expansion of industrial, agricultural and urban areas has outstripped our limited resources. The arable land area in the country is very small. So now we are facing serious problems of water supply and our future development may be at stake. Yes, we have made the desert bloom, using precious groundwater for irrigation to help produce wheat, barley, tomatoes, melons, dates, citrus fruits, mutton and poultry – but at a price. Some of our irrigation practices can be wasteful, our drainage systems are often inadequate – thus increasing the salinity of the soil – and unplanned and unmonitored pumping have led to a significant lowering of the groundwater levels and in some cases have caused springs to dry up.

In its *World Water Development Report – Water for People, Water for Life*, released in March 2003, the United Nations World Water Assessment Programme (WWAP) has drawn attention to these very issues, and especially to the trade-offs involved when many users are competing for the same, scarce resource. It speaks of 'inertia at the leadership level' and warns us that the global water crisis will reach unprecedented levels in the years ahead, with 'growing per capita scarcity of water in many parts of the developing world', unless action is taken now.

This *Report* is itself a sign of commitment and political will: it represents the first time that the 23 United Nations agencies and commissions dealing with water have worked together to monitor progress against water-related targets in such fields as health, food, ecosystems, cities, industry, energy and risk management. It is fitting that the *World Water Development Report* be addressed to national policy-makers and others in a position to influence the water agenda.

Specialization and competence

Within this collective effort, each agency has its own areas of specialization and competence. This diversity is the United Nations' greatest strength. In the freshwater domain, UNEP, for example, is particularly concerned with water quality through the GEMS/WATER Global Environmental Monitoring System which is a collaborative effort with the World Health Organization (WHO), and inputs from the World Meteorological Organization and UNESCO. In a broader environmental context, it looks at biodiversity issues, climate change, land degradation, water flows and the interactions between environment and development.

UNESCO has a mandate to promote peace, human development and security through its fields of competence. Its ▶

Cheng Hongdao/UNEP/Topham

interest in water is grounded in a long-standing engagement with scientific investigation of the hydrological cycle, but has never been limited to science for its own sake. Thus, by creating the International Hydrological Programme (IHP) in 1975, it pioneered efforts to provide a scientific basis for evaluating global water resources and formulating ethical and socio-economic principles to guide water management and development practices. Today, the roles of education, training and creative partnerships are assuming a central place in the effort to build a better and more secure future.

Setting goals

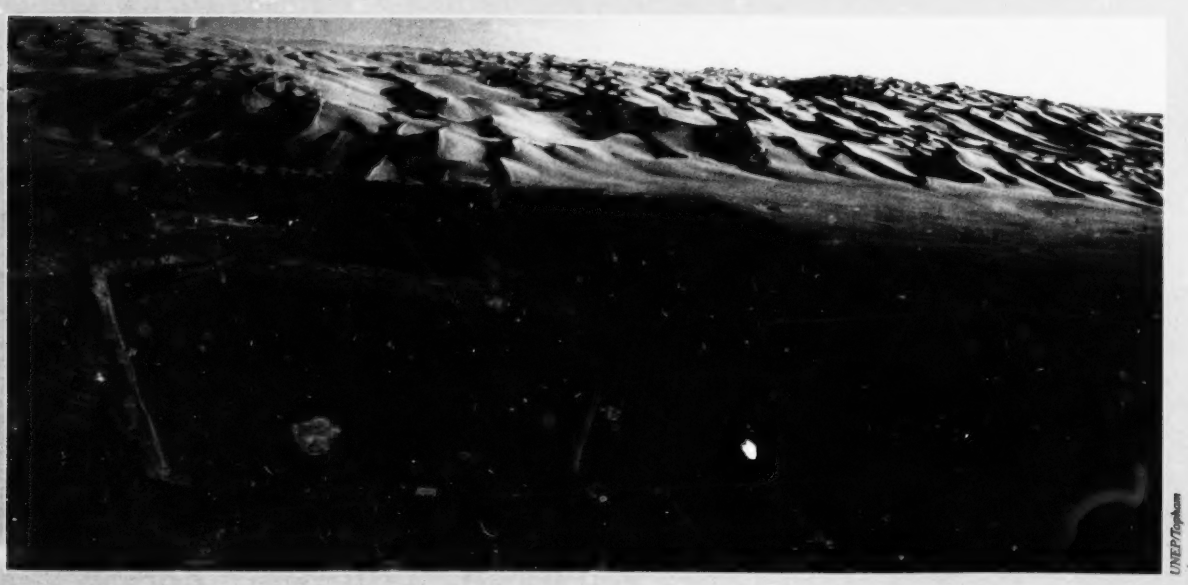
In September 2000, world leaders pledged to halve the proportion of people unable to reach or to afford safe drinking water. Then at the 2002 World Summit on Sustainable Development in Johannesburg, a matching target was agreed to halve by 2015 the proportion of people without access to adequate sanitation.

Each of us in our daily lives can make a difference; each community and each region too

Meeting these targets requires coordinated action, not just from governments, but from all of us who use water – and abuse it. Each of us in our daily lives can make a difference; each community and each region too. The International Year of Freshwater therefore provides us with the rare opportunity to take stock of our actions and behaviour.

We have a saying in Arabic that 'Water is Life'. Let us remember this simple phrase each time we turn on the faucet or take a drink of water. Let's get the message out ■

HRH Prince Talal Bin Abdul Aziz Al Saud is UNESCO's Special Envoy for Water during the International Year of Freshwater 2003.



UNEP/Topham

THE WATER *century*

RYUTARO HASHIMOTO says that resolving water issues will be the paramount challenge of the 21st century, and describes the work of this year's 3rd World Water Forum in addressing them

I am deeply honoured that Japan had the opportunity to organize the 3rd World Water Forum in the venues of Kyoto, Shiga and Osaka; rich in culture and history and in their association with water.

The 21st century has been called the century of water – 2003 is the International Year of Freshwater. Some 2 billion people in the world are facing water shortages. Our planet Earth has been losing the balance between the amount of usable water and the demand, and even the balance of the ecosystem and our ability to co-exist with nature. The imbalance between the volume of available usable water and the demand for that water has led not only to shortages but to other serious problems as well, such as the decrease of groundwater reserves, water pollution and general deterioration of water resources. These have in turn led to a decrease in the diversity of water-related species and an increase in the number of species on the verge of extinction around the world.

Retreating glaciers

'The Earth is bleeding,' says Japanese alpinist Ken Noguchi, referring to the abundant water flow from melting glaciers in the Himalayas. It is a heart-breaking metaphor for the impact of global warming and the retreat of glaciers. Noguchi frequently climbs Mt. Everest to clean up the mountain. He has told me many sad stories reflecting the change in nature and the tragic accidents befalling mountaineering parties in areas where nothing of the sort had happened before. It is indeed as if the Earth were screaming. One such warning cry came in the form of last year's series of floods in many locations around the world – including Europe, which seldom suffers from flooding.

It is no wonder that we are hearing the term 'water crisis'. Moreover, considering the continuing increase of the world's population, it is no exaggeration to say that resolving water issues is the paramount challenge of the 21st century if we are to protect our mother Earth.

However, it was also patently clear at ▶

Resolving water issues is the paramount challenge of the 21st century

Guillermo Kamoya Andrade/UNEP/Topham

Stephen Dedman/UNEP/Topham

the Johannesburg Summit last August that the world's attention is keenly focused on water issues. The international community agreed at the Summit that there is an urgent need for a new approach: by 2015 'we must reduce by half the proportion of people' with no access to safe water and sanitation facilities. Although the Summit was highly valued for its new objectives with concrete numerical criteria, there is also a need to decide upon concrete means of achieving those objectives and to sustain them from now onwards.

Responsibility and leadership

The 3rd World Water Forum was the first international opportunity to follow up on the Summit and work towards such concrete actions. Japan successfully organized the 3rd World Water Forum – the first to be held in Asia – with a sense of responsibility to provide leadership in this important movement, which will help to decide the future of the Earth, our planet of water.

Over the past three years several organizations have contributed to the preparation of this serious mission, working to ensure that the Forum would be a conference to realize action, a suitable follow-up to Johannesburg, and not a 'conference for conference's sake', dealing in abstractions. I am proud that this three-year process, which involved massive participation, offered up a Forum suitable for converting the World Water Vision – the fruit of the 2nd World Water Forum held in The Hague – into concrete action.

The process established three guiding principles, that this Forum be:

1. open to all;
2. created through partnership by all;
3. focused on translating visions into concrete actions and commitments.

All of us must continue to do our utmost to step forward and resolve water issues

In order to realize these principles, we established the Virtual Water Forum (VWF) on the Internet and the Water Voice Project, which collected voices on water at the grassroots level.

The VWF hosted more than 150 sessions involving more than 5,000 registered participants, and the discussions are continuing now, even after the Forum's conclusion. Similarly, our Water Voice Project, intended to complement the VWF, collected some 30,000 voices from around the world thanks to the cooperation of more than 2,000 volunteers and some 160 partner organizations: these voices are brought together in the Water Voice database, which is accessible along with the Virtual Water Forum at the Forum's website: www.worldwaterforum.org.

During this preparation period we also created a water network linking the activities of many conferences on water held around the world and encouraged organizations to hold sessions at the World Water Forum itself. As a result, the Forum hosted 349 sessions classified in 33 major themes and 5 regional days (see box).

Dialogue for change

The last three years' preparation has been a bottom-up approach that included a great number of participants not seen in other international conferences. The Forum brought together participants from both developed and developing countries, with dialogue as the key element, to come up with water actions appropriate to this century of water.

I hope that the 3rd World Water Forum helped the process of overcoming today's serious water problems and deepened global understanding of world water issues so that we can leave a better planet to our children in the 21st century. But, as the 3rd World Water Forum itself concluded, we cannot take its outcome for granted. All of us must continue to do our utmost to step forward and resolve water issues. I hope this approach will long continue ■

Ryutaro Hashimoto is Chairman of the National Japanese Steering Committee of the World Water Forum.

Issues

Agriculture, Food and Water
CEO (Chief Executive Officer) Panel
Children's World Water Forum
Dams and Sustainable Development
Financing Water Infrastructure
Floods
Gender and Water Panel
Groundwater
Integrated Water Resources Management (IWRM) & Basin Management
Public Private Partnership
Science, Technology and Management Panel
Union Panel
Water and Cities
Water and Climate
Water and Cultural Diversity
Water and Energy
Water and Governance
Water and Information
Water and Parliamentarians
Water and Poverty
Water and Transport
Water Development Partners Panel
Water for Peace
Water Journalist Panel
Water Supply, Sanitation, Hygiene and Water Pollution
Water, Education and Capacity Building
Water, Food and Environment
Water, Life and Medical Care
Water, Nature and Environment
Youth World Water Forum

Special Programmes

Agricultural Ministers' Meeting on Water, Food and Agriculture
World Water Actions
World Water Assessment Programme

Regional Days

Day of Africa
Day of Asia and Pacific
Day of Europe
Day of the Americas
Day of the Middle East and Mediterranean

Taking it at THE FLOOD

WANG SHUCHENG describes a change in philosophy that has brought new strategies for flood control and disaster mitigation in China

Flood and drought coexist in mainland China because precipitation – affected by the monsoon climate – is distributed very unevenly, both in time and space. For several thousand years, flood disasters have been the hidden trouble threatening the existence and development of the Chinese people.

River harnessing and flood control have been carried out on an unprecedented scale since the foundation of the People's Republic of China in 1949. As a result, flood disasters were preliminarily brought under control: 85,000 reservoirs of various kinds with a total storage capacity of 520 billion cubic metres have been constructed; 270,000 kilometres of dykes have been built along the major rivers and lakes; and hundreds of flood detention and storage zones have been developed. All these achievements have attracted world attention.

Since the 1990s, China has again entered a period of frequent floods. Although the total affected area is reduced, the losses are huge due to social and economic development in the flood zone. Urbanization is bound to speed up in the 21st century and thus raise higher the requirements for flood control and disaster reduction.

UNEP/Topham

Strategies for mitigation

Against this background, flood control and disaster mitigation have become significant issues for sustainable development in China. Readjusting the strategies for achieving them is absolutely crucial.

Over the past 2,000 years or so, the main strategy in China has been to regulate and restrict floods with all sorts of structural measures. Historical experiences have told us that it is difficult to eliminate flood disasters completely. Humankind must learn to live with the floods and enjoy harmonious co-existence with nature.

As early as 6 B.C., a Chinese scholar called Jia Rang proposed, in the *History of the Han Dynasty*, that river harnessing should adapt to the laws of floods and that human production and settlements should avoid them by resiting to unaffected areas. This is similar to today's philosophy of combining both structural and non-structural measures, reflected in the revised Water Law of the People's Republic of China, passed in October 2002. Article 15 of the Law emphasizes that regional social development should be in accordance with flood control planning. In other words, it is imperative to change from just preventing water harming humankind to paying special attention to preventing humankind harming water, and thus being harmed by it.

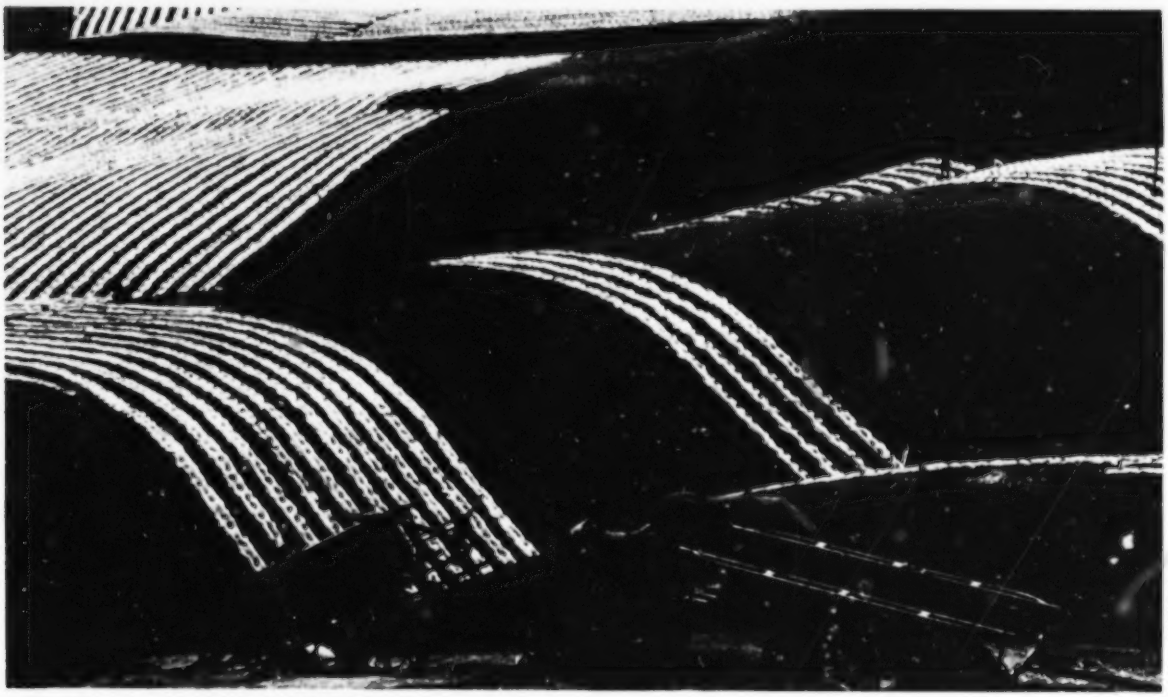
Flood disasters have both natural and social attributes: if one is missing there is no disaster. This duality has led to coordinated management, using structural measures to harness floods while at the same time readjusting social and economic development to adapt to them.

Adaptation does not mean passive avoidance. It involves respecting nature and human society with the aim of achieving sustainable social development. People have increasingly realized that 'natural' disasters are not all natural. Human activities have been the main cause of increasing flood disasters and losses during the past hundred years or so.

These dual attributes have led to a change in philosophy. Since the devastating Yangtze River floods in 1998, the Chinese Government has given in-depth thought to the issue and readjusted its work on flood control strategies. The major breakthroughs in this readjustment include both an emphasis on planning flood control projects under the greater framework of basin-wide ecosystem rehabilitation, and applying systematic theories and risk management. This demonstrates a transition from flood control to flood management.

Significant progress

Over the past five years, significant progress has been made in flood control and disaster mitigation. Structural measures provide the basic guarantee for social stability and development. During this period the Chinese Central Government has spent around $21.7 billion in the water sector. ▶



S C Bang / NIP Topham

focusing on reinforcing dykes along the major rivers and lakes. By the end of 2002, 3,500 kilometres of dykes on the middle and lower reaches of the Yangtze River and nearly 1,000 kilometres of dykes on the Yellow River had reached design standards. To minimize negative impacts, an overall economic and environmental impact assessment is encouraged in planning and design, and the concept of green GDP is introduced.

Behavioural change

The social behaviour of overexploiting the land, and thus making the flood situation worse, has been regulated. For example, polder fields affecting flood release along the Yangtze River and other major rivers have been abandoned. At present, 3,000 square kilometres of polder fields have been turned back into lakes to restore the ecosystem of the Dongting and Poyang Lakes and others; this has increased the regulating capacity of the rivers and lakes by 13 billion cubic metres. As part of this process, the Government allocated funds to relocate 2.4 million people to safe, nearby areas.

Flood control has changed from emphasizing capital construction, such as building dykes and reservoirs, to developing an integral flood control system. There have been large-scale ecosystem rehabilitation campaigns in the middle and upper reaches of the rivers, including turning farmland into forests, planting trees and grass, and conserving water and soil. A total of 120 million cubic metres of sediment have been dredged from the beds and estuaries of major rivers. Information systems for flood control have provided advanced measures for scientific decision.

Resolving the relationship between humankind and nature is a precondition for the progress of human society

Social management of flood control areas, dyke protection areas and flood plains has been strengthened, various kinds of economic and social activities have been regulated, and compensation policies for the use of flood detention and storage areas have been formulated.

As a departure from attempting to eliminate flood disasters completely and release the water into the sea, efforts have been made to bear a certain degree of risk, to formulate feasible flood control standards and flood regulating schemes, and to make comprehensive use of various measures to ensure safety within set standards and minimize losses when the floods exceed them.

Floods are not completely harmful. They are also carriers of material transfer in the rivers and are important in maintaining ecosystem balance in river basins. In countries like China, which are short of water, floods are also a key component of utilizable water resources. In recent years, therefore, flood control has changed from disaster mitigation to using flood resources to recharge ground water.

New line of thinking

Resolving the relationship between humankind and nature is a precondition for the progress of human society. Sustainable social development represents the people's rational thoughts about the future. Regulating the relationship between humankind and nature is the core issue of achieving sustainable development. Reducing losses caused by water disasters – as well as attaching importance to population, resources and the environment – is most crucial in realizing this objective. We are fully confident in pursuing this new line of thinking – though China still has a long way to go in flood control and disaster mitigation ■

Wang Shucheng is Minister of Water Resources of the People's Republic of China.

RENEWING *the commitment*

PAULA J. DOBRIANSKY outlines the international strategy for meeting the world's water needs and describes what the United States of America is doing to implement it

Tom Stoddart/UNEP/Topham

Let me describe an all too common situation in the developing world. In an alleyway on the outskirts of a large city sits a gaping earthen pit. At the bottom of the pit, a small water line lies exposed, possessing so little water pressure that it cannot supply the single above-ground tap nearby. Local residents climb to the bottom of the hole, where the steady drip from the punctured line fills their buckets. Getting enough water for a family requires patience, and there is no guarantee the water is safe. Clandestine connections such as this provide the only access to water for many poor residents of peri-urban areas. Combined with a lack of sanitation facilities, unsafe water supplies promote the spread of devastating water-borne diseases, and pose a daily health risk to the people that use them. This is simply unacceptable.

Appropriate management of water resources is essential for economic growth and human health. People depend on water to drink, to grow food, to generate energy, to provide transportation, and to maintain healthy ecosystems. Mismanagement of water resources can exacerbate the effects of floods and droughts and increase disease. In cases where water is shared among many users, increased tensions may lead to conflict.

Important steps

The international community has taken important steps to address world water needs, with special attention to the more than 1.1 billion people who lack access to safe drinking water and the 2.4 billion who lack access to adequate sanitation. Work has been done to develop a strategy to address these and other global water challenges. At the 2nd World Water Forum in The Hague and the International Conference on Freshwater in Bonn, consensus was reached on the importance of several themes to water management. I want to highlight five key conclusions:

1 Governments must prioritize meeting the basic water and sanitation needs of their people in development and poverty reduction strategies.

2 Governments must work together to manage shared water resources.

3 Water must be managed in an integrated manner, optimizing its use among competing demands while protecting land, freshwater and marine ecosystems.

Tom Stoddart/UNEP/Topham

4 Potable water, sanitation and hygiene are inextricably linked, and action must be taken in each area to reduce the threat of water-related diseases.

5 The global community will need to mobilize all sources of financing, including domestic capital, to address water-related infrastructure needs.

World leaders, meeting in Monterrey in 2002, broke new ground by recognizing the shared role developed and developing countries have in addressing these problems. For donor countries, this meant a new commitment to providing the kind of development assistance required to open markets. For developing countries, this meant a new commitment to good governance, to investing in their own people and to creating the domestic conditions required to enable effective use of donor assistance and employment of all resources, particularly those in the private sector.

At the World Summit on Sustainable Development (WSSD) in Johannesburg, countries agreed to a framework for sustainable development that is built on the principles of Monterrey. It focused on implementing a water strategy based upon work completed in The Hague and Bonn. WSSD outcomes were anchored by the idea that sustainability requires national governments to take responsibility for their own development. Partnerships among stakeholders were identified as a key means to implement this new agenda. The water and sanitation goals that emerged from WSSD provide important focus to global efforts. The Johannesburg Plan of Implementation (JPOI) reaffirmed the Millennium Declaration goal of 'halving, by 2015, the proportion of people unable to reach or afford safe drinking water', and set a complementary goal to increase access to sanitation. The outcomes of WSSD helped the world expand beyond defining the water problem to focusing on potential solutions.

New partnerships

In Johannesburg, the United States announced several partnerships and initiatives relating to water. We launched the 'Water for the Poor' initiative, a three-year, $970 million dollar collection of activities in three key areas: drinking water and sanitation, watershed management, and increasing the productivity of water use. Working in partnership with non-governmental organizations and the ▶

Tom Stoddart/UNEP/Topham

private sector, we aim to improve sustainable management of freshwater resources in developing countries, and put into action the JPOI. At WSSD, the United States also launched the 'White Water to Blue Water' partnership, which promotes the practice of integrated watershed and marine ecosystem management in support of sustainable development. Our partnership includes the nations of the wider Caribbean. Together we are developing new approaches in areas such as wastewater and sanitation, sustainable agricultural practices, tourism and maritime transportation.

Joint projects

At WSSD, US Secretary of State Powell and Japanese Foreign Minister Kawaguchi announced the 'Clean Water for People' initiative. Under this initiative the United States and Japan will embark on a number of joint projects to promote access to safe water in the developing world. Since this announcement in September 2002, the United States and Japan have engaged in joint visits to review projects in key areas, and shared ideas through technical representatives. During the 3rd World Water Forum in Kyoto, Osaka and Shiga, Japan, we joined other countries in reporting on the progress of our WSSD initiatives, as experts exchanged ideas on new areas for action.

Recently, we have given considerable thought to complementing our WSSD initiatives with augmented efforts and new partnerships. Increasing access to water in the developing world – by drilling wells, establishing rainwater collection, and improving water distribution networks, among other activities – will be critical. Ensuring the quality of both existing and future water supplies will be equally essential. Finally, as the demand for infrastructure develops, financial resources will be required. Ensuring the sustainability of solutions is vital. Developing nations and their partners need to identify mechanisms that, once launched, will operate and grow on their own, providing needed resources and services.

To address the critical need for financing, the United States has successfully implemented the Development Credit Authority (DCA) programme in several countries. DCA is a US Agency for International Development financing tool that mobilizes local capital to fund sustainable development initiatives. Using a risk-sharing approach with non-sovereign partners, DCA encourages financial institutions to lend to viable projects that otherwise might not be funded in underserved markets worldwide.

The United States has also developed and successfully implemented a financial mechanism that may have great applicability in the developing world – the State Revolving Fund. These funds provide an effective means of mobilizing domestic capital for infrastructure development, using a variety of mechanisms including pooled debt, direct loans, credit enhancement and risk-sharing with local lenders. A revolving fund provides long-term, sustainable support for infrastructure investments. If handled correctly, the fund can operate indefinitely – offering continuous opportunities for investors and support for borrowers, while developing local capital markets.

No person should have to climb to the bottom of a mud pit, or walk 6 kilometres, to get the water they need to live

It has also become apparent that household-level interventions are an effective and efficient way to meet basic water needs. For example, several cost-effective products exist that disinfect water after it is collected for household consumption. These include dilute chlorine-based solutions and other water disinfectants or filters, which can be locally produced.

When demand for available and effective products is created, and coupled with education and hygiene programmes, field experience shows that a 50 per cent or greater reduction in water-related disease among target populations can be achieved in a short period of time. Once the demand for these products has been established, the market grows and becomes self-sustaining. For example, in Zambia and Madagascar, $600,000 in donor funding helped create a market for water disinfectant products that have reached more than 2 million people. While this is only a short-term solution, it lays the groundwork for fee-for-service infrastructure. Communities experience the benefits of clean water, and lives are saved.

On-the-ground action

These are just some of the ideas and on-the-ground actions to address the world's water challenges that the United States is exploring and implementing with our partners. The United States is working actively to help bring relief to the millions who suffer from water-related diseases, and the hundreds of millions for whom getting enough water is a daily struggle. No person should have to climb to the bottom of a mud pit, or walk 6 kilometres, to get the water they need to live, and no one should die from the water they drink. On World Environment Day, the American people join the world community in renewing our commitment to make this a reality ■

Dr. Paula J. Dobriansky is United States Under Secretary of State for Global Affairs.

Tomas Hoehne/UNEP

WATERLESS CITIES

ANNA KAJUMULO TIBAIJUKA shows that the urban water and sanitation crisis is much worse than official statistics suggest, and outlines action to meet key global goals

As we enter the urban millennium – with half of humanity already living in towns and cities – one third of the urban population, an estimated 1 billion people, live without adequate sanitation and basic services. Cities and towns are without question centres of opportunity. But when they lack clean water, decent sanitation and basic services in this way, they are among the most life-threatening environments on Earth.

National statistics often disguise the true extent of the problem. Most existing surveys presume that, with 'improved' provision of water and sanitation, all city dwellers are better served than the rural poor. Based on such criteria, official statistics confidently report that 94 per cent of all urban populations have improved water provision and 84 per cent have improved sanitation.

City-level data from 43 African cities, however, show that 83 per cent of the population lack lavatories connected to sewers; in large Asian cities the figure is 55 per cent. In Mahira, a section of Haruma slum in Nairobi, there is just one lavatory with ten units and two bathrooms for a settlement of 332 households with 1,500 inhabitants. A 1998 survey of 7,512 slum households in Ahmedabad found that 80 per cent had no water connection and 93 per cent had to rely on dirty communal lavatories.

What these individual city studies indicate is that – if assessment is widened to measure the proportion with access to safe water and clean sanitation facilities – the number of inadequately served urban dwellers is much higher than is officially acknowledged.

Using these criteria, UN-HABITAT's new report, *Water and Sanitation in the World's Cities*, estimates that as many as 150 million urban residents in Africa – up to 50 per cent of the urban population – do not have adequate water supplies, while 180 million – or roughly 60 per cent – lack adequate sanitation.

In urban Asia, 700 million people – again half the population – do not have adequate water, while 800 million people – again 60 per cent – are without adequate sanitation. In Latin America and the Caribbean the figures are 120 million and 150 million urban dwellers, representing 30 and 40 per cent respectively.

The impact on the poor is well documented. Every year 2.2 million deaths – 4 per cent of all fatalities worldwide – can be directly attributed to inadequate supplies of clean water and sanitation. Women spend hours collecting water. The poor pay ten to a hundred times as much as the rich for every litre.

At the macro-economic level, lack of clean water and sanitation directly impact labour productivity. Peru's GDP was estimated to have lost about $232 million in just one year in 1991, when it suffered a cholera epidemic.

The international community will have to confront the problems of the urban poor if it is to meet the Millennium Development Goal (MDG) target of halving the proportion of ▶

We must wake up to the fact that the urbanization of poverty is one of the greatest challenges we face

Tony Clemson/UNEP/Still Pictures

people without access to clean water and adequate sanitation by 2015. In a rapidly urbanizing world, successfully meeting this goal is also closely linked to the MDG commitment to improve the living conditions of at least 100 million slum dwellers by 2020.

Despite the increasing urbanization of poverty, many international donor agencies avoid supporting programmes targeted at urban populations on the assumption that the poor in cities are privileged compared to those in rural areas. Only about 2 to 12 per cent of the funding of the agencies that publish disaggregated figures tends to go to urban projects. This proportion must increase if the MDGs are to be achieved.

There are indications that more money will indeed be made available for investment in water and sanitation for the urban poor. The commitment of the Asian Development Bank (AsDB) and the Government of The Netherlands to fund UN-HABITAT's Water for Asian Cities programme is a case in point. Even more importantly, AsDB has also agreed to make available a $500 million fast-track credit line for pro-poor investment in the urban water and sanitation sector.

Improving governance

Increased investment is critical, but even more so is the urgent need to find more successful mechanisms for providing the poor with water and sanitation. It is interesting to note that corruption and poor governance were the major reasons cited by most aid agencies and development banks for withdrawing from large-scale capital projects in urban areas in the developing world in the 1980s.

At the same time, multinational companies and bankers tend to look for large-scale investments, with values of $100 million or more, that will serve more than a million residents. They consider as unbankable smaller projects aimed at servicing specific neighbourhoods and communities of the urban poor.

Another reason why the provision of water and sanitation is so inadequate for much of the urban population of Africa, Asia and Latin America is that investments in water and sanitation were made in cities with political systems that had no interest in improving conditions for low-income groups. Where they turned to privatization, it proved difficult to reconcile the interests and priorities of large private companies with the slow, difficult and often expensive investments needed to ensure adequate provision for the poor.

Many local authorities still underestimate the importance of inclusive practices of good governance in prioritizing the delivery of services to the urban poor. However, UN-HABITAT's experience shows that successful water demand management at this level can reap benefits for the whole community.

UN-HABITAT's Water for African Cities programme, a direct follow-up to the 1997 Cape Town Declaration adopted by African Ministers, is the first initiative of its kind to support municipalities in managing growing water demand while protecting their sources from increasing wastage and pollution.

Up to 50 per cent of the urban water supply in many African cities is being wasted through leakages or is otherwise unaccounted for. The programme is therefore working with the municipalities of Abidjan, Accra, Addis Ababa, Dakar, Dar es Salaam, Johannesburg, Lusaka and Nairobi to establish an effective demand management strategy to encourage domestic users, industry and public institutions to use water efficiently. Some cities have already reduced water consumption by 35 per cent.

Community involvement

Many well-documented case studies show that it is quite possible to improve the living conditions of the urban poor if local governments allow community-based organizations – especially those representing the poor – a greater role in determining policies and projects. Pakistan's world-famous Orangi Project was an important pioneer in this, showing how over 90,000 households could provide themselves with low-cost flush latrines. In the Sambizanga area of Luanda, Zambia, a partnership between the local authority, the private sector and the community ensured that the poor could receive clean water at a reasonable cost. The key to success, in every case, has been public-private partnerships that include the poor themselves.

UN-HABITAT's report, *Water and Sanitation in the World's Cities*, documents many of these case studies. It argues that public-private partnerships that prioritize small-scale investments at the community-level are a cost-effective way to solve the immediate problems of the urban poor. Meanwhile, effective demand management strategies can provide considerable water savings while increasing the income of the local authority. This enables municipalities to use pricing policies and regulatory measures to meet the urgent needs of the urban poor.

Reassessment and innovation

We must all prioritize the needs of the poor to ensure the success of local action for global goals. We must wake up to the realities of the urban age, which condemn almost 1 billion poor slum dwellers to suffer from the dangers and indignities associated with the lack of clean water and adequate sanitation. The international community has set the targets: if we are to meet them we must be prepared to look at everything anew. We must reassess our statistics. We must re-examine our policies and ask why we have failed in the past. We must innovate new strategies of good urban governance. We must invest more funds in urban infrastructure.

Most of all – in this urban millennium – we must wake up to the fact that the urbanization of poverty is one of the greatest challenges we face ■

Anna Kajumulo Tibaijuka is Under-Secretary-General of the United Nations and Executive Director of UN-HABITAT.

Keeping POLLUTION AT BAY

WAYNE GILCHREST describes how cutting freshwater pollution can preserve wetlands and restore valuable marine ecosystems

David J Cross / NEP Ingham

Pulling my oar through the waters of Turner's Creek, propelling my canoe toward the Sassafrass River, I felt a resistance I hadn't known in decades. Glancing down I saw full, healthy, green seagrass breaking the water's surface 2 metres above the creek bed. Against all odds, the grass had returned this past summer. It is these very seagrass meadows, so long missing, that are one of the keys to the health of the Chesapeake Bay – or conversely a sign of its sickness.

As nitrogen runoff overloads the Bay at roughly 300 million tonnes per year, algae feed off the fertilizer and bloom to overwhelming proportions, soaking up the light and oxygen needed by seagrass and other vital elements of the Bay's ecosystem. As the meadows die off the Maryland blue crab, the pride of the Chesapeake, loses its natural hiding place. Rockfish – whose population has recently rebounded due in large part to a moratorium in the Chesapeake begun in 1985 and gradually phased out over the last several years – then feast on their exposed prey. As crab populations decline, their ability to act as natural waste managers goes with them, and the downward environmental spiral continues. The return of seagrass, in my mind, demonstrated the Bay's resilience in the face of tremendous pressures and was a signal of hope for everyone in its watershed. It turned out that the grass had returned due to a severe drought over the spring and summer of last year which drastically reduced the amount of runoff from land in the region. Less rain means less runoff. The grass responded by flourishing as it had done only in the memories of watermen in bygone days. So, while we clearly cannot – and should not – hope for constant summers of droughts, the short-term rebound has reaffirmed my faith in the measures we have taken, and will continue to take, to promote the long-term health of the Bay.

Policy model

The Chesapeake Bay presents an interesting model for environmental policy-makers. Situated in a densely populated region, it takes a regular environmental beating from airborne and land-based ▸

Wetlands offer a value to our economy in the form of natural waste management

Thomas J Salada/UNEP Topham

sources of pollution from hundreds of kilometres away, including urban and suburban runoff made all the worse by sprawl and outdated sewage treatment plants. Methods to curb the threats to the Bay's health are well known but underfunded. I have long supported programmes that offer farmers and landowners incentives to reduce nutrient runoff while keeping working land productive. During last year's Farm Bill debate in the US Congress, my colleagues and I advocated increased funding for the US Department of Agriculture's conservation programmes: these offer farmers the opportunity to create stream buffers that absorb and reduce runoff, protect and restore important habitats, and support soil conservation measures that benefit the economy and the environment.

My amendment to the Farm Bill would have protected hundreds of thousands of acres of wetlands and other important habitats each year: wetlands offer a value to our economy in the form of natural waste management that far exceeds what we could ever accomplish without them. Our proposal would also have prevented thousands of acres of productive farmland from being converted to development. What better way to reduce runoff than to attack pollutants at the source?

The public must be mindful of the impacts they can have on public resources

Although our comprehensive agriculture conservation amendment fell a few votes short, the final Farm Bill included unprecedented levels of funding for conservation. It is imperative that Congress continues to provide strong support for agriculture conservation programmes, demonstrating that we are serious about protecting agriculture and our water resources.

Individual responsibilities

We also have other tools to address these threats. We must reauthorize and strengthen the Clean Air and Clean Water Acts, paying careful attention to existing sources of pollution as well as new ones. But equally as important, we must reflect on what we can do as individuals. Before spraying fertilizer, herbicides or pesticides on the grass in our backyards, we need to ask ourselves if it is worth risking the impact on increasingly scarce water treasures.

The public must be mindful of the impacts they can have on public resources. Ultimately, it will take a concerted effort by policy-makers to create incentives for individuals to adopt more sustainable practices.

Hope for the future

As my old, rusty canoe slid over the seagrass meadow opening out into the Sassafrass River, I imagined myself peering through crystal-clear waters spotting oyster reefs and lush seagrass beds. My hope is that, in the not too distant future, everyone who canoes down a tributary of the Bay will find it teeming with fish and crabs dodging their every stroke. It is nature's resilience that makes this vision a possibility, but it is only our resolve that can make it a reality ■

The Honorable Wayne Gilchrest is Chairman, Resources Subcommittee on Fisheries Conservation, Wildlife and Oceans, US House of Representatives.

PEOPLE

President Mwai Kibaki of Kenya has appointed **Prof. Wangari Maathai,** (left) one of Africa's most prominent environmental campaigners, as his country's Assistant Minister of the Environment, Natural Resources and Wildlife. Prof. Maathai, who is a member of the UNEP Sasakawa Environment Prize Selection Committee, will be working with the new Minister **Dr. Newton Kulundu.**

A professor of zoology, Wangari Maathai founded Kenya's Greenbelt Movement 26 years ago to fight deforestation and desertification in the country. The movement has planted over 15 million trees, produced income for at least 80,000 Kenyans, and spread to more than 30 countries in Africa and around the world.

She campaigned vigorously against the clearing of forests, amongst other environmental issues, and was both jailed and beaten under the previous government. She was active in the political opposition and won a parliamentary seat in the national election at the end of last year by an overwhelming margin, winning 27,992 votes against 554 for her closest rival.

Klaus Toepfer, UNEP's Executive Director, wrote to Prof. Maathai to express his pleasure. He said: 'We have always admired your courageous stand on environmental issues ... Your voice has always been heard in defence of the less fortunate.'

Prof. Maathai said: 'I am sure that President Kibaki will be very good for the environment. He is very committed to the environment.'

At much the same time **Senator Marina Silva** (below), one of Brazil's foremost environmentalists, took office as her country's Minister of the Environment. A former rubber tapper, who worked alongside the late **Chico Mendes,** she became the youngest senator in Brazil's Republican history in 1994. When she took office on New Year's day she said that the objective of the new Government of **President Luiz Inácio 'Lula' da Silva** was 'to develop the country with social and environmental justice'.

Both new Ministers are previous winners of the Goldman Environmental Prize for grassroots activists. The seven new laureates announced in April include **Julia Bonds** (centre right), a former Pizza Hut waitress who is leading the campaign to stop opencast coal mining in the Appalachian Mountains in the United States, and aboriginal elders **Eileen Kampakuta Brown** and **Eileen Wani Wingfield** (right) who are at the forefront of a campaign to block construction of a nuclear waste disposal facility in South Australia ■

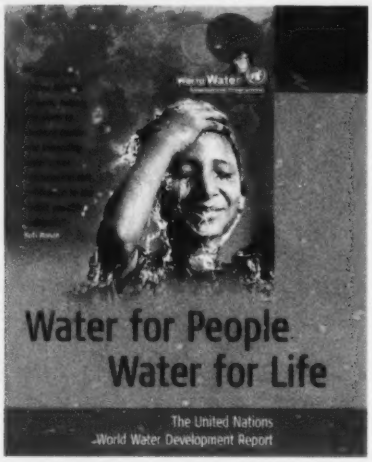
The Rolling Stones – in partnership with the Natural Resources Defense Council (NRDC), one of the United States' leading environmental non-governmental organizations – held their first free concert for three decades in Los Angeles in February to raise awareness of global warming.

Some 12,000 fans won tickets through an Internet draw, while others were given passes by radio stations. Actors Leonardo DiCaprio, Pierce Brosnan, Cameron Diaz and Lisa Kudrow, and director Rob Reiner, were among the celebrities in the audience. Former President Bill Clinton introduced the rock and roll band.

Lead singer Mick Jagger (above) said that the decision to do the concert was an easy one. 'We decided that we thought it was a good cause and we would do it,' he said. NRDC President John H. Adams said: 'The Rolling Stones deserve a standing ovation for putting the environment on centre stage' ■

Mohammed Valli Moosa, South Africa's Minister for Environmental Affairs and Tourism, was appointed Chairman of the 11th session of the United Nations Commission on Sustainable Development, following up the World Summit on Sustainable Development in Johannesburg in September 2002 ■

***Emilio Gabbrielli,** the Managing Director of Thames Water Do Brazil, has been appointed as Executive Secretary of the Global Water Partnership* ■



The world's water crisis

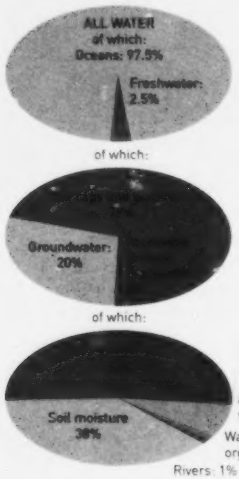
The Earth, with its diverse and abundant life forms, including more than 6 billion humans, is facing a serious water crisis. All the signs suggest that it is getting worse and will continue to do so unless corrective action is taken.

This crisis is essentially one of poor water governance. But the real tragedy is the effect it has on the everyday lives of poor people, who are blighted by the burden of water-related disease, living in degraded and often dangerous environments, struggling to get an education for their children and to earn a living, and to get enough to eat.

The crisis is also experienced by the natural environment, which is groaning under the mountain of wastes dumped on it daily, and from overuse and misuse, with seemingly little care for future consequences and future generations.

In truth it is attitude and behaviour problems that lie at the heart of the crisis. We know most (but not all) of

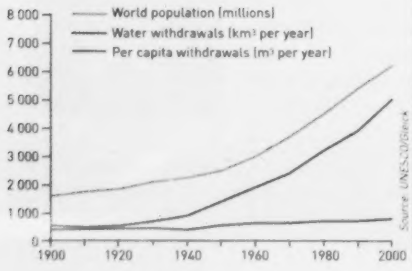
Where the water is



Source: AAAS/Atlas of Population and Environment

World water withdrawals rose sixfold over the last century. It has been estimated that humanity now appropriates 54 per cent of accessible runoff, and could be using 70 per cent by the year 2025.

Global trends in water withdrawals, 1900-2000



Source: UNESCO/Shiklomanov

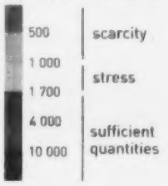
Renewable freshwater supplies

1995

2025

Source: UNEP/Vital Water Graphics/GRID

Annual renewable supplies per capita per river basin (m³)



The amount of freshwater in the world remains constant, but its uneven distribution and increasing demand create growing scarcities. At present some 40 per cent of the world's population live in areas with moderate to high water stress. By 2025 this is expected to increase to two thirds – or 5.5 billion people.

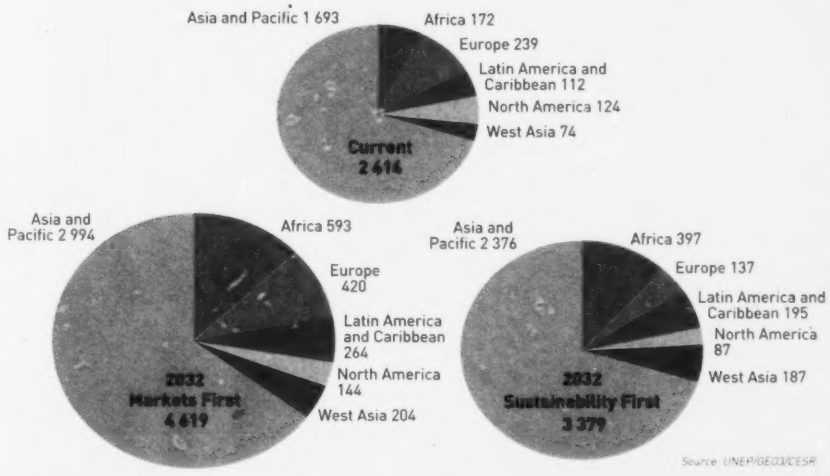
what the problems are and a good deal about where they are. We have the knowledge and expertise to begin to tackle them. We have developed excellent concepts, such as equity and sustainability. Yet inertia at leadership level, and a world population not fully aware of the scale of the problem (and in many cases not sufficiently empowered to do much about it) mean we fail to take the needed timely corrective actions and put the concepts to work.

For humanity, the poverty of a large percentage of the world's population is both a symptom and a cause of the water crisis. Giving the poor better access to better managed water can make a big contribution to poverty eradication. Such better management will enable us to deal with the growing per capita scarcity of water in many parts of the developing world.

Solving the water crisis in its many aspects is but one of the several challenges facing humankind as we confront life in this third millennium, and it has to be seen in that context. We have to fit it into an overall scenario of problem-solving and conflict resolution. Yet of all the social and natural resource crises we humans face, it is the one that lies at the heart of our survival and that of our planet Earth ■

Excerpted from the first* United Nations World Water Development Report, *a joint undertaking of 23 United Nations agencies, including UNEP.

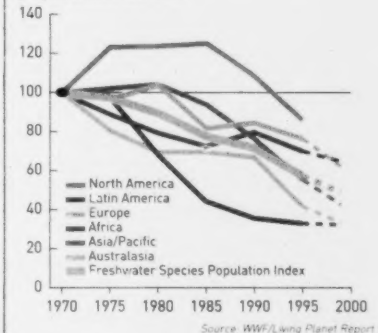
Number of people living in areas with severe water stress (millions)



Source: UNEP/GEO3/CESR

UNEP's GEO 3 *report provides different scenarios of water shortages. 'Markets First' adopts the expectations prevailing in today's developed countries and severe water stress increases in almost all parts of the world. 'Sustainability First' – a new environment and development paradigm – shows the area under severe water stress remaining more or less constant and, though the absolute number of people increases, the proportion of the world's population living in conditions of water stress remains much the same.*

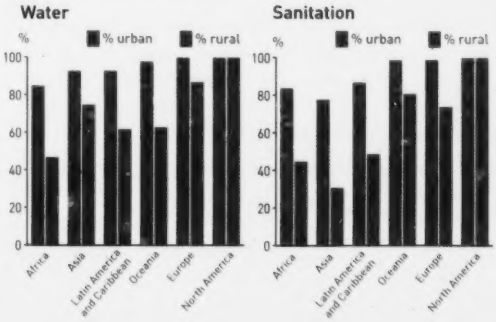
Regional freshwater species population trends



Source: WWF/Living Planet Report

Species have been declining faster in freshwater than in any other habitat on Earth. About half the world's wetlands have been lost, and more than a fifth of known freshwater species have already been driven to extinction. Over the last 30 years, the Freshwater Species Index fell by 50 per cent. WWF points out that the relatively smaller decline in North America and Europe shown by the index is deceptive: much of the loss in industrialized countries occurred before 1970.

Populations with access to improved water supply and sanitation, 2000



Source: WHO/Global Water Supply and Sanitation Assessment

Recommended basic domestic water requirement

Litres per person per day

Drinking water*	**5**	
Sanitation	**20**	
Bathing	**15**	
Food preparation**	**10**	
Total	**50**	**(0.05 m³)**

* Minimum for sustaining life in a moderate climate and with average activity
** The daily per capita water requirement for growing food prior to preparation averages 2 700 litres

Source: Gleick/The World's Water

More than 1 billion people lack access to a steady supply of clean, safe water, while 2.4 billion lack adequate sanitation. More than 2 million people die each year from associated diseases; including 6,000 children every day. The situation has been improving but, at the present rate of investment, universal access to safe drinking water cannot reasonably be anticipated before 2025 in Asia, 2040 in Latin America and the Caribbean, and 2050 in Africa.

CHANGING *agenda*

RICHARD JOLLY describes old fallacies and new directions for water, sanitation and hygiene

Over the last few years developments have been moving fast in the field of water and sanitation. They were gathering momentum at the end of the 1990s. Then in September 2000, at the United Nations Millennium Summit, the target of halving the proportion of those without adequate water supplies by 2015 was made one of the eight Millennium Development Goals. Two years later, water was one of the five key issues – Water, Energy, Health, Agriculture and Biodiversity – at the Johannesburg Summit on Sustainable Development. Water was one of the successes of the Summit, which otherwise received mixed ratings, as it agreed the goal of halving the proportion of people without access to adequate sanitation by 2015.

Meanwhile new commitments have been forged and elaborated in a succession of lively interactions – at three World Water Forums; by a World Water Commission; and by the launch of WASH, a global campaign for Water And Sanitation and Hygiene for all.

Putting the record straight

But in spite of this new-found energy and drive, the task is enormous. And it is not made any easier by a series of fallacies:

1 *'Sanitation and hygiene are less important than water'*. From the viewpoint of health and security, the facts are otherwise. The knowledge and practice of basic hygiene reduces mortality further than either safe water or sanitation alone. All three are needed – but with a better balance. Too often sanitation and hygiene are treated as dirty words, not to be mentioned in polite society.

2 *'Goals never work'*. In spite of gossip to the contrary, most of the 50 or so economic and social goals set by the United Nations over the last 40 years have had a measurable impact, being achieved by a large number of countries. The International Water Supply and Sanitation Decade of the 1980s, for example, stimulated enormous action, nationally and internationally. Though the 1980s were an economic disaster for many countries, the number of people with access to safe water and improved sanitation in developing nations more than doubled. Major improvements were also made in developing low-cost technologies and learning the secrets of maintenance and sustainability.

3 *'It's all a matter of hardware and little can be done to promote sanitation and hygiene'*. Again, many examples show otherwise. Stimulating demand, promoting awareness and encouraging action can all draw on tried and proven techniques. Encouraging hand-washing alone could save a million lives.

4 *'Finance is not available and those without water and sanitation are too poor to be able to contribute'*. Hundreds of examples show the enormous energy, effort and resources that poor people are willing to contribute to gain access to water and better sanitation, when they have the opportunity.

5 *'Poor people and poor communities are not interested and have other priorities for survival'*. In fact, poor people are highly motivated, both because they want to save the time spent in collecting water and for reasons of dignity and safety. This is especially true for women and girls – which explains why issues of water and sanitation often get neglected or played down in situations or discussions where men dominate.

Mobilizing stakeholders

So what can be done to accelerate action towards the goals? The priority is not just to provide more of the same but to set new directions and a new agenda, as is being promoted by the WASH campaign.

First, governments need to stimulate and support community action, rather than try to do it all themselves. All stakeholders need to be mobilized – people and communities, the private sector, small-scale entrepreneurs, public and private donors, international agencies – and government at all levels, especially the local one. Action at the local level matters most. Community groups need to become active in defining priorities, taking action and pressing for support from local government.

Second, plans and programmes are needed for achieving the goals. These should not be desk exercises but participatory planning, bringing in all the stakeholders to draw up guidelines for action and define what is required from each of the parties. This can be a win-win exercise for development and politics. Increasing access to water can be one of the most popular government activities, especially with women.

Third, there is a need for new priorities, to learn from the past and to embark on new directions. Some examples:

- Participation: women in India and elsewhere have shown they can bring new energy and vision to the task after achieving serious representation in local government. In Sudan, women trained as technicians have long demonstrated their capacity to maintain and repair deep tube wells; indeed, they do it better than their male counterparts who, once trained, often leave for towns and cities to seek technical jobs.
- New approaches: in Bangladesh, the '100% sanitation approach' has demonstrated new ways to mobilize rural communities. Instead of individual advocacy, a non-governmental organization facilitator works with a whole village to identify its sanitation needs. Village leaders, and as many others as can be mustered, walk across the village, stopping and discussing every time they discover faeces or

Community groups need to become active in defining priorities, taking action and pressing for support from local government

Photo: Jon Warren/UNICEF

other waste. This may involve some naming and shaming: it is not designed to identify the individual person responsible but to understand the consequences when the village as a whole fails to ensure ways of avoiding behaviour which no one finds acceptable. Action to improve the situation is identified and talked through, but individuals are left to develop their own solutions. This has led to new designs for low-cost latrines and waste disposal.

■ Mobilizing children as agents of change: if schools, churches or mosques get the lessons of basic hygiene across to children, they will spread the messages when they get home. But, for this to be effective, the school must enable children to practice what it preaches. Separate latrines for girls and boys are essential – and a goal of the WASH campaign.

■ Building momentum and synergy: this can be achieved by linking action for hygiene, sanitation and water to support for the other Millennium Development Goals as part of a broad thrust to cut poverty reduction nationally and globally.

The potential can be simply summarized. Better hygiene is the goal. Creating demand is the starting point. Building accountable institutions to support communities is the means. And a better quality of life for over 2 billion people is the prize ■

Sir Richard Jolly is Chair of WSSCC – the Water Supply and Sanitation Collaborative Council – and Research Associate and Honorary Professor of the Institute of Development Studies, Sussex, United Kingdom.

Sanjit Acharya/UNEP Typhoon

Nor any drop TO DRINK

ASHOK KHOSLA says that water scarcity is damaging health, constraining agriculture and industry and becoming a potent source of conflict

To some, humankind might well appear to be winning its battle with nature. But, if the conflict continues for much longer, it is certain to lose the war. Long before we have managed to extinguish all the other species that share this planet with us, the destruction of its fragile life support systems will surely have wiped out whatever we value as civilization.

More and more people inhabiting the planet, each wanting more and more things: this is hardly a sustainable proposition in the face of a finite resource base. Human ingenuity and technology can only buy us a little time – they cannot solve the underlying, fundamental problem. That can only be done by slowing the growth of demand for the services that our environment provides.

Over the past 30 years, the limits set by nature have become increasingly evident to some of us. But to many more they have not. The main reason is, of course, that for most people – as for most ostriches – it is easier to ignore impending danger than to make the inconvenient changes needed to deal with it. For them, such limits will become apparent only after they have already been transgressed. The trouble is that – given the exponential mathematics of natural processes and the long lag times between cause and effect – when the proof becomes available, it is already too late.

But how much proof do we need? Fossil fuels may well appear to be plentiful today, but even dyed-in-the-wool petroleum geologists admit that it will not be many decades before they become quite scarce, particularly if everyone starts using them as cavalierly as the industrialized countries do now. Why else would well-informed nations go to war to protect supplies of such resources?

Support systems

The threats to life support systems – the stratospheric ozone shield, global climate, biodiversity – have already reached stages where, within a decade or two of being recognized, they have raced to the top of the international agenda.

Of all resources and natural processes, water is the one over which major conflict is most likely to occur within the next few decades – not just among nations, but also between provinces and within communities. The signs of such conflict are already with us, sometimes manifest in outright violence, sometimes camouflaged by uneasy truces and agreements: in the American Southwest, in the Danube Basin, in the Indian Subcontinent.

Water is the lifeline of most human activity: agricultural, industrial, domestic. Nearly 70 per cent of all living tissue and more than 50 per cent of all raw materials in industrial production consist of water. Not only civilization, but life itself, depends on water.

Water has been taken for granted – and never explicitly treated as a resource – because it has been freely and plentifully available for most of history, and in most parts of the world. But, suddenly, it no longer is. Population growth and economic activity have, within the space of a few decades, taken it from worldwide abundance to local scarcity.

The primary reason for this is that, by tradition, water has been an 'open access' resource. It has been available, on a first-come first-served basis, freely and for free. This meant that it was used, and misused, without concern for its intrinsic cost or for its contribution to value addition. Or for the impact on its long-term availability. And, of course, as it becomes increasingly scarce, it goes

Elwood Harrison Gbamen/UNEP Typhum

mainly to those who have the political power or economic capital to appropriate it by controlling the sources and distribution channels.

Recent studies have shown that water, more perhaps than any other resource, is grossly underpriced. Many users in agriculture, industry and homes get it at a price that is one hundredth that of the cost of delivering it. And one thousandth that of the value it adds to the products or services it makes possible.

No wonder our agriculture and industry depend on technologies that waste this precious resource with so much profligacy. And result in such rapidly accelerating scarcity.

Achieving equity

Water, like any other scarce resource, needs to be priced. Neither too high, nor too low – but judiciously graded to make it accessible to all segments of society. It also needs to be placed within the local control of communities, which can decide on its distribution among the different uses and users who need it.

Only thus will it be conserved and sustained – and also be equitably and fairly available to everyone, rich and poor.

We are now at a point where water scarcity is not only constraining agriculture and industry, but severely jeopardizing the health of our people. As the population grows and each person demands more and more goods and services that depend on water, this scarcity can only get worse.

Water scarcity is severely jeopardizing the health of our people

Dual cycle

Water shortage is at the root of two of the prime examples of the vicious cycles in which socioeconomic processes can get caught up. In the first case – the vicious cycle of poverty and water – lack of clean water leads to disease, loss of productive time and financial costs, which in turn lead to loss of disposable income and therefore to inability to pay for clean water, which in turn leads to further deterioration in health and productivity, which in turn leads to loss of income, and so on.

The second, perhaps not so obvious, outcome is the vicious cycle of affluence and influence. Those who can afford to do so buy high-quality water for all their needs, and ensure that they are adequately insulated from the impacts of the general scarcity of the resource. This is not a minor phenomenon: the money spent today in many countries on bottled drinking water is comparable to the total funds spent by public agencies on drinking water supply. The rich no longer have a major stake in the quality and performance of the public service and little incentive to use their influence to change policies or investment priorities. The result is a move towards privatization of services for the rich and marginalization of the services accessed by the poor.

Neither type of vicious cycle can ultimately be good – for anyone, rich or poor.

Viable balance

Achieving a viable balance between supply and demand for water is no easy task. The issues are complex and causes often get mixed up with effects. Supply and demand are often not independent of each other: interventions that increase supply can also increase demand, frequently resulting in little net improvement at best, and at worst in a counterproductive boomerang effect. Most present policies and actions unfortunately have a tendency to deal with symptoms and cures rather than prevention, getting short-term gains at the expense of long-term societal goals.

No complex problem can be solved with simple, one-dimensional measures. So, particularly, it is with water. Even so, it is useful to work on such issues through conceptual frameworks that are easily and widely understandable. For water, as for other resources, these boil down to the three primary pillars of sustainable development:

- The people-nature issues – management of water resources.
- The people-machine issues – technologies for water.
- The people-people interactions – institutions for water.

The solutions lie in bringing back the trees and regenerating the aquifers; installing local, small water-harvesting structures; full-cost pricing; very careful, judicious use of subsidies; water-conserving technologies; and responsive management systems. These in turn need the same three pillars of human endeavour: good management practices to encourage the natural resource conservation, good science to design such practices, and good institutions of governance to help internalize them as community decision-making processes ■

Ashok Khosla, the 2002 UNEP Sasakawa Environment Prize laureate, is President of Development Alternatives.

BRIDGING *troubled waters*

PEKKA HAAVISTO describes how environmental cooperation, particularly over shared water resources, could aid the Israeli-Palestinian peace process

The long-lasting Israeli-Palestinian conflict, combined with the Israeli occupation of the Palestinian territories, has affected the territories' freshwater supplies and environment in many ways. There have been direct impacts, caused by military activities; indirect impacts, caused by the war-like situation; and an overall environmental degradation due to a lack of administrative management and public awareness.

Many of the most direct impacts have resulted from military actions. Sewage systems, water supply lines and other infrastructure have been destroyed as part of collateral damage. Destruction of buildings has also led to the release of hazardous materials such as asbestos.

The indirect impacts have exacerbated these. Curfews and roadblocks, for example, have prevented people from using designated landfills. The waste collection system has collapsed. As a result, wastes are often burned in the middle of towns during curfew periods.

Declining environmental quality

These immediate and acute consequences of conflict occur alongside the long-term degradation of environmental governance. In times of conflict, few resources are available for developing environmental management systems or for educating people about how to take better care of the environment. This leads to an easily visible general decline in environmental quality in many parts of the West Bank and Gaza, where landfills are not being properly managed, groundwater is not being protected from the many sources of contamination and sewage is flowing directly to the sea.

The fight over land use is yet another critical aspect of the conflict. Israeli settlements have their own roads and other infrastructure and manage their wastes and water supplies separately from those of their Palestinian neighbours. Each side has made many claims that the other is permitting pollution to cross their borders. The settlements are accused of not handling their wastes properly, while some Palestinian dumpsites (where open burning of wastes is a normal practice) are located very near Israeli settlements.

UNEP has conducted a Desk Study on the Environment in the Occupied Palestinian Territories to try to produce an objective assessment of the situation and to facilitate co-operative action; UNEP's 22nd Governing Council in February 2003 unanimously requested UNEP to implement the report's 136 recommendations. Both parties in the region made critical comments about some of the recommendations – but they also recognized that environmental cooperation is essential.

Common interest

Building bridges between the two partners where they have a clear common interest can make a constructive contribution to the peace process. Israel and the Occupied Palestinian Territories share the same aquifers, for example: protecting them is essential for people living on both sides of the border. There is already an agreement between Israel and the Palestinian Authority that keeps water issues out of the conflict. We can hope that this kind of thinking may soon apply to all environmental topics.

UNEP is now preparing for the implementation of the 136 recommendations according to the mandate given by its Governing Council. This will involve close cooperation with both the Palestinian Authority and the Government of Israel. The UNEP Governing Council has asked to see a progress report when it holds its next regular meeting in February 2005.

There must be a common understanding of the scientific data when environmental issues are discussed. The UNEP Desk Study, therefore, is addressing the need for high-quality water modelling of the shared aquifers. Currently there are two serious environmental threats to these groundwater resources. The first is over-pumping – the water levels are clearly falling. The second is the quality of the groundwater which, especially in the Gaza aquifer, is worsening rapidly. Agricultural chemicals, pesticides and open burning in landfills are all having serious consequences for freshwater resources.

A first step

Modelling how the aquifers function would be the first step in gaining better understanding of all the environmental risks facing the water supply. Such a study should be followed by stricter protection measures of the region's invaluable groundwater resources.

Environmental degradation and problems with groundwater in the region do not just concern the people living there today. They will also affect future generations. Environmental co-operation could be a valuable tool in the Middle East peace process and is vital for safeguarding the environment for the future ■

Pekka Haavisto is Chairman of UNEP's Desk Study on the Occupied Palestinian Territories.

BOOKS & PRODUCTS

McDONALD'S has opened a pioneering climate-friendly restaurant after consultations with UNEP. Its new restaurant at Vejle in Denmark is the world's first HFC-free fast-food establishment.

The project began two years ago following an international 'refrigeration summit' hosted by McDonald's, UNEP and the United States Environmental Protection Agency. As a result of what it learned there, the hamburger chain decided to accelerate ways of finding sustainable refrigerant technologies.

Denmark was chosen because it had already started initiatives to phase out HFCs (hydrofluorocarbons) and the restaurant was opened by its Environment Minister, Hans Christian Schmidt. It is equipped with state-of-the-art refrigeration and ventilation systems using environmentally innovative refrigerants that do not contain freon or HFCs.

János Maté of Greenpeace International said: 'Greenpeace welcomes the bold step McDonald's has taken in opening this first ever HFC/HCFC-free restaurant. We hope it is the first of many for the company and that it sparks more sustainable innovation from the refrigeration industry and others in the food service sector.' ■

The Energy Future Coalition, a foundation supported initiative, is finalizing plans for a campaign to change United States energy policy to bring about major long-term impacts on three great challenges, and seeks to connect these with a vision of the vibrant economic opportunities that will be created by a transition to a new energy economy.

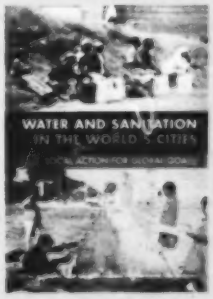
The challenges are: the political and economic security threat posed by the world's dependence on oil; the risk to the global environment from climate change; and the lack of access of the world's poor to the modern energy services they need for economic advancement.

The Coalition, mostly supported by **Ted Turner** philanthropies, has attracted an impressive array of leading figures, including senior members of the former Clinton and Bush administrations, top energy industry executives, heads of non-governmental organizations and senior trade unionists. It will attempt to use the national debate during the 2004 United States election campaign process to create the conditions for change ■

Some 150 river basins – where cooperation between the countries that share them is patchy or absent – could be flashpoints for future disputes unless urgent action is taken, says a new book published for World Water Day. The Atlas of International Freshwater Agreements – compiled by UNEP, the Food and Agriculture Organization of the United Nations and Oregon State University – shows, however, that the sharing of resources has been more common than conflict. Available from orders@earthprint.com ■

This year marks the tenth anniversary of the ***European Union's Flower eco-label,*** *which has now been awarded to 125 products. France, Italy and Denmark account for 80 of the awards between them, and 74 have been given to textile products and indoor paints and varnishes.* ***Margot Wallström,*** *the EU Environment Commissioner, says that the number of eco-labelled items sold has tripled since the year 2000* ■

Water and Sanitation in the World's Cities, *a report by UN-HABITAT, sets out in detail the scale of inadequate provision of these essential services. It is a comprehensive and authoritative assessment of the problems, and of how they can be addressed. Available from Earthscan, orders@lbsltd.co.uk ISBN 1-84407-004-2* ■



UNEP's Division of Technology, Industry and Economics has published a comprehensive package of training modules and checklists under the title **Profiting from Cleaner Production.** The package – which follows demand-driven design, testing, adaptation and implementation in five demonstration countries on three continents – is for use by decision-makers and practitioners in business, financial institutions and government. Available from orders@earthprint.com ■

GETTING THERE

RAVI NARAYANAN describes the hurdles in the way of achieving the Millennium Development Goals on water and sanitation and outlines strategies to overcome them

As the new millennium opened, 1.1 billion people had no access to safe water, and 2.4 billion lacked access to improved sanitation – making up one sixth and two fifths of the world's population respectively. The international community has pledged to halve both these proportions by 2015*.

If these targets are to be met in Africa, Asia, Latin America and the Caribbean – taking population increase into account – the number of people served by water supply must increase by 1.6 billion (32 per cent) and those served by sanitation by 2.2 billion (59 per cent). The Global Water Partnership estimates that an additional $30 billion needs to be spent each year – $17 billion of it on sanitation.

Policy-makers need to overcome a series of hurdles if they are to bridge the resource gap and make sure that the international targets become reality.

The first is the lack of financial resources allocated to the sector – whether from external aid and investment or from national budgets. Realistically, significant foreign direct investment (FDI) will not be available to this group of countries for reasons of risk and the lack of business opportunities likely to bring acceptable returns on investment. Even in countries which can attract FDI, many of the poorest people do not benefit from investment in the water and sanitation sector.

Maximizing impacts

The remaining financial avenues are governments' own budgetary allocations, official development assistance (ODA), and finance raised by local communities and/or supplemented by local financial institutions. These resources are limited and their impact needs to be maximized.

Our own research and field experience lead us to suggest the following:

- If official development assistance from OECD nations – and from other groupings of rich countries such as the European Union – is focused on countries on the basis of poverty rather than of political expediency, considerably more resources will be available to the really poor nations with the largest numbers of people lacking safe water and sanitation. In practice, the least developed countries received less aid for water and sanitation than the low/middle-income countries during the 1990s.
- The amount of aid allocated to low-cost water and sanitation programmes is abysmally low. The OECD's Development Assistance Committee reported in 2000 that only 1.7 per cent of all sector-allocable aid is earmarked for this purpose. There needs to be both a general increase in ODA and a rise in the priority given to aid for water and sanitation for poor people. Equally, allocations for these services from developing countries' national budgets need to be increased very significantly.
- Funds made available through debt relief can, and should, be used to develop national water strategies which prioritize

Jimmy Dorrell / VIEW Pictures

Policy-makers need to overcome a series of hurdles if they are to bridge the resource gap

water and sanitation within overall poverty reduction strategies.

■ There must be coordination between major donors, especially over support for national water strategies. Unconnected one-off projects, negotiated between individual donor countries and selected local government departments, are unlikely to be sustainable or effective in the long term. Therefore the development of national water strategies by developing countries, and the importance they give to them in their national development plans, are crucially important.

■ Local consumer financing schemes through micro-credit unions and groups can be an important source of finance both in rural and urban areas. They are ideally suited for rapidly developing low-cost, decentralized services. In both Bangladesh and India micro-credit is widely used, particularly to provide households with their own sanitation facilities.

Appropriate technologies

The second hurdle is the lack of attention paid to using technologies that poor communities can afford and, even more crucially, maintain.

Choosing appropriate and affordable technology and standards of service is crucial both for getting the best value (the widest coverage for the least cost), and for operation and maintenance capabilities, which are directly related to achieving sustainability and protecting investment in these services. Indeed, the sustainability of services ought to be a prime consideration in any investment in water and sanitation programmes. We have found, for example, that poor communities in Niassa province in Mozambique would prefer to step down the technology ladder and use protected wells rather than boreholes and hand pumps, because they cannot afford the cost of the spares required to maintain the pumps.

Choice and accountability

The third hurdle arises when poor people and communities are not consulted about the solutions most appropriate to their needs and are left with no choice, and when no accountability is demanded of governments and donors.

It is important to ensure wide and informed participation of people – including customers – in understanding the application of funds and the consequent benefits. Transparency in the decision-making process, and the availability of information, are crucial in maintaining public overview, minimizing corruption, avoiding wastage and building credibility in the system of governance (an essential prerequisite for optimum financial functioning, including the readiness to pay for services). Civil society organizations have a well-proven capability in championing the interests of poor people and developing their ability to ensure that public funds are used for their benefit. Using aid to widen this capacity will reduce 'leakages' in the system and improve standards of governance.

If scarce resources are to be used optimally, grants or concessional finance must be provided to build the technical skills, organizational abilities, planning coordination and monitoring capabilities of local governments – especially at district level and below, where projects are actually implemented.

Combined strategies

Safe water and sanitation services invariably improve wherever these hurdles are overcome. Ways of overcoming them vary from country to country, depending on the economic circumstances, hydro-geological conditions and systems of administration and government. But there are enough examples around the world which can be used as a basis for scaling up solutions so as to move decisively towards achieving the Millennium Goals on water and sanitation. In combination, these strategies would enable the international community to deliver on these ambitious objectives ■

Ravi Narayanan is the Director of WaterAid.

** The United Nations Millennium Summit in 2000 added the target for safe water to the Millennium Development Goals, and two years later, the World Summit on Sustainable Development agreed the target for sanitation.*

Sinking FAST

JONATHAN LOH and **LISA HADEED** detail the rapid loss of species in freshwaters, the worst affected habitat on Earth

Biodiversity has declined more catastrophically in freshwater ecosystems in recent years than in any other of the Earth's major habitat types. The WWF Living Planet Index suggests that populations of freshwater species have fallen by a half on average worldwide since 1970 – compared with a drop of 30 per cent for marine species and 10 per cent for those of the forests.

Ten thousand of the 25,000 known species of fish – 40 per cent of the world total – live in freshwater, yet it makes up only about 2.5 per cent of the world's water – and less than 0.01 per cent if ice caps and underground waters are excluded. Freshwater ecosystems – wetlands, rivers and lakes – also account for a disproportionately large fraction of global biodiversity in terms of their size relative to the Earth's surface.

Much the largest river system in the world – covering nearly 6 million square kilometres – is the Amazon and its tributaries. Its size, and its position along the equator, make it the Earth's most biodiverse freshwater ecosystem. The world's largest, deepest and oldest freshwater lake, Lake Baikal, is also very rich in freshwater species. Over half its animal species – 982 out of a total of 1,825 – are endemic, found nowhere else in the world. This reflects the age of the lake as much as its size, since time itself has allowed so many unique species to evolve. By contrast, most of the world's lakes are young, formed in the last ice age, and so are comparatively poor in species.

Worldwide threat

All around the world, freshwater fish species are threatened with extinction: about 20 per cent of them in the 20 countries which have been comprehensively assessed for the IUCN–The World Conservation Union *Red List*. Around 35 per cent of freshwater turtle species are similarly threatened. Freshwater birds and mammals are less at risk – probably because it is easier for them to move from one wetland, lake or river basin to another – but wholly aquatic mammals are less fortunate. Four of the five species of river dolphin (the Amazon, Ganges, Indus and Yangtze) are threatened, for example, as are all three species of manatee (Amazonian, Caribbean and West African).

Maria Cecilia Gesin/UNEP

The Yangtze river dolphin *Lipotes vexillifer* – known in China as the *baiji* – is the most critically endangered. Chinese Government scientists are attempting to relocate the last 100 remaining *baiji* to try to save the species: pollution, fishing and river traffic have brought its population down from an estimated 6,000 in the 1950s. If caught, the dolphins will be released in the specially created Tian'erzhou nature reserve in Hubei province, centred around an isolated 21 kilometre stretch of the river, which became cut off when the Yangtze changed course.

The rate of extinction of freshwater fish species far exceeded natural background rates in the last century. Ninety-one species are listed as having become extinct in the 100 years up to 1996, including 50 Lake Victoria cichlid fishes. A further 11 species are recorded as extinct in the wild, but still survive in captivity.

Multiple causes

Ecological degradation of freshwater ecosystems over the last 100 years has largely resulted from four kinds of human activities. The first is the withdrawal of water for human use – whether in farms, by industry or in the home – and the pollution caused by returning the water afterwards. People are estimated to use over half of the accessible freshwater runoff worldwide. Withdrawing most of the available surface water from its tributary rivers has led to the destruction of the Aral Sea in Central Asia.

The second major cause of biodiversity loss is the direct alteration of freshwater habitats, such as by building dams, or draining wetlands and periodically inundated floodplains for farming. Dam building has had the biggest influence on the aquatic environment in many river catchment areas. Fish which migrate up rivers to spawn before returning to the sea find that their passage is barred. The Colorado River in the United States has been so severely disrupted by dams that its waters barely reach the sea: as a result, all the fish species in its lower reaches have died out or survive only in isolated pockets. The lack of freshwater flowing out from the river has also caused ecological decline in the Gulf of Mexico.

Building 33 major hydroelectric dams and associated infrastructure in the catchment area of the Mobile Bay drainage basin in the United States has caused the extinction of 38 out of 118 species of what was the richest freshwater snail fauna in the world. Most of the snails' habitat has been destroyed by silt accumulation behind dams and the submergence of shallows.

Direct exploitation

The third pressure on freshwater ecosystems comes from direct exploitation, usually overfishing. Not just fish, but other freshwater species – such as crustaceans and molluscs – are caught commercially, while some – like crocodiles and caimans – are hunted for their meat or skins.

The fourth is the deliberate or inadvertent introduction of alien species which are either predators, parasites or competitors of native ones. Many biologists now believe that this is the greatest of all causes of decline in freshwater biodiversity.

Like Lake Baikal, the lakes of the African Rift Valley are

Known 20th century freshwater fish extinctions

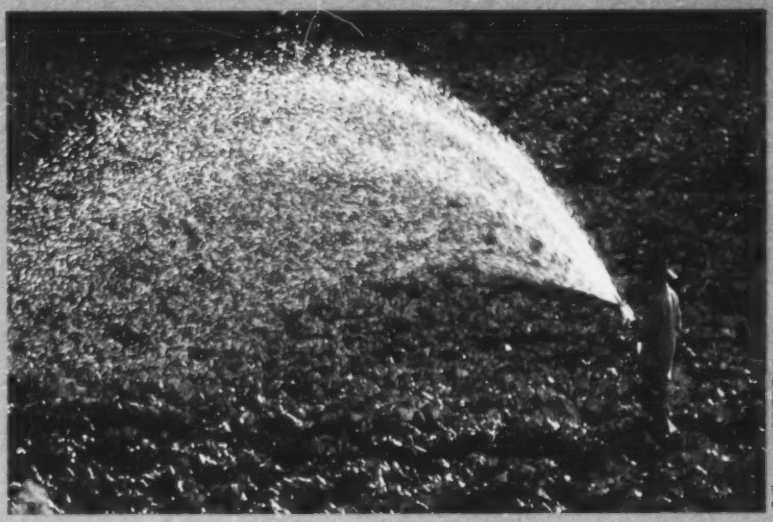
ancient and support a great variety of species. Lake Malawi has the highest species richness of any lake, due to its phenomenal variety of cichlid fishes; over 600 of its 640 fish species are endemic. Many of the endemic freshwater fish species of the Rift Valley have become very rare or extinct in recent decades, following the introduction of the Nile perch *Lates niloticus*. Introduced to Lake Victoria around 1970 for harvesting for food, it turned out to be a voracious predator of the endemic cichlids. Before its introduction the lake supported around 300 species of haplochromine cichlid fishes, many never scientifically described and known to experts only by their common names. Now over half are extinct or too rare to be caught and studied.

Alien plants

Exotic plant species can also present huge problems. The free-floating South American water hyacinth *Eichhornia crassipes* has become a major pest wherever it has been introduced around the world, especially in Africa and Asia. It grows fast and spreads rapidly, blocking water channels, clogging hydroelectric installations, impeding boat traffic and preventing fishing.

Regional and global changes such as acid rain and global warming are also thought to be adversely affecting freshwaters. Although there are clear links between acid rain and a loss of diversity in rivers and streams, these widespread phenomena have not yet been implicated in the extinction or major decline of a species ■

Jonathan Loh is Editor of WWF's Living Planet Report; *Lisa Hadeed is WWF International's Communications Manager.*



© Chanoreman/UNEP/Topham

Waste NOT

POLLY GHAZI describes the potential for using water more efficiently to meet looming shortages

Much of the water we use is wasted, creating the potential for vast savings in precious supplies through conservation. Agriculture, for example, accounts for 70 per cent of all water use, yet 20 to 30 per cent of supplies used to irrigate fields trickle away or evaporate. Industry soaks up 54 per cent of supplies in Europe, where water efficiency is generally low on the list of corporate priorities. And in many countries at least 30 per cent of domestic water supplies leak away.

Conservation technologies and strategies for reducing water demand were high on the agenda at the 3rd World Water Forum in March 2003. Governments have begun to shift away from building large-scale, expensive and often unpopular dams and reservoirs, recognizing that protecting and re-using water can be cheaper and more sustainable than endlessly seeking out new supplies. As Peter Gleick, Director of the Pacific Institute for Studies in Development, Environment and Security in Oakland, California puts it: 'Whichever country you look at, improving water efficiency is quite simply the cheapest and most efficient means of improving supply.' He and other conservation-minded water specialists argue for a combination of efficiency technologies, reduced water subsidies, public information campaigns and better targeted aid programmes.

Effective technologies already exist, for example, to minimize the wastage of water used for crops, industrial production, drinking, bathing and lavatory flushing. For farmers, the biggest water users, these include levelling land to minimize runoff, drip irrigation which virtually eliminates waste by delivering water directly to plants' roots, and low-pressure sprinklers which avoid overwatering. In India, Israel, Jordan, Spain and California, drip irrigation has slashed water use by 30 to 70 per cent while increasing crop yields by 20 to 90 per cent. Early versions of these technologies were expensive, but poor farmers in developing countries are now reaping the benefits of newly designed low-cost drip and sprinkler systems. Villagers in the northern Himalayas, for example, use a $5 bucket sprinkler kit to water vegetable plots more efficiently. And in Bangladesh, rice paddies that previously lay fallow during dry months have been transformed into year-round productive land by the use of groundwater-drawing foot-operated treadle pumps. So far 1.2 million of the $35 pumps have been sold, increasing farmers' average incomes by up to 30 per cent a year. Many countries are also using simple technologies, such as ▶

Mandayam Parmar/UNEP

harvesting rain to conserve drinking water. In Andhra Pradesh, the development charity WaterAid is helping local communities collect rain and channel wastewater back into the ground to recharge supplies. 'For a few dollars per person you can make a huge difference to the lives of communities and whole regions,' says Simon Trace, head of its international operations. But he warns that if projects are to be sustainable in the long term, communities must be able to operate the equipment and afford the running costs when aid agencies leave.

Tiered pricing

Other nations are introducing tiered pricing systems, backed by public information campaigns, to discourage overuse by businesses and households. In South Africa, 23 million citizens now receive 6,000 litres of free water a month and pay an increasing fee for whatever extra they use: household water use has dropped substantially in several cities as families strive to stay within the 6,000 litre limit. The city government of Mexico City saved enough water to supply a quarter of a million new residents by replacing 350,000 old lavatories with low-flush ones.

In industrialized countries – where households consume vast quantities of water in washing, lavatory flushing and gardening – a combination of public awareness campaigns and tighter regulations governing water-using appliances is slowly reducing wastage. A low-flow lavatory installation programme introduced in the 1990s in New York City reduced water use per building by 29 per cent a year. Free low-flow showerheads followed and water use per person fell from 738 to 640 litres a day between 1991 and 1999. Similar programmes in Boston produced a 25 per cent fall in demand. Under federal law, all new lavatories sold in the United States are now low-flow. Water use by industry is also dropping, due partly to new, more efficient manufacturing technologies and partly to replacing water-intensive metals such as steel with alternatives such as aluminium. Industrial water use has dropped by a fifth in the United States since 1980, while in Japan industrial water efficiency quadrupled between 1965 and 1989. Recycling wastewater is also increasing in industrialized countries. Treated wastewater already provides 30 per cent of farm water supply in Israel – and may reach four fifths by 2025 – and is increasingly used to grow fruit and vegetables in California. Exponents of integrated water management such as Peter Gleick argue that central and local government must educate consumers in the awareness of water conservation, price water to penalize excessive users and reward conservers, shift taxes from labour to resource conservation and even encourage people away from a meat-rich, water-intensive diet.

Governments have begun to shift away from building large-scale, expensive and often unpopular dams and reservoirs

In the developing world, much of the focus will remain on agriculture. At present, sprinklers service only 10 to 15 per cent of the world's irrigated fields; drip systems just 1 per cent. Spreading such technologies could cut farm water demand by up to 50 per cent and reduce poverty and hunger. 'The need to increase aid effectiveness to increase access to water cannot be understated,' Dr. Mahmoud Abu-Zeid, President of the World Water Council and Egypt's Minister of Water Resources and Irrigation, told an international meeting of water experts in Canada last summer. He urged donors to provide simple, low-cost irrigation and water storage technologies across Africa. All in all, conserving water must play an important part in the world's efforts to reach its goal of halving by 2015 the proportion of people without ready access to drinking water and sanitation ■

Polly Ghazi is a Senior Correspondent of Green Futures *magazine.*

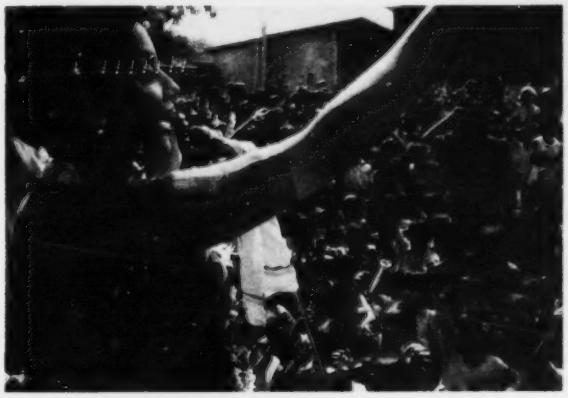
WATER
the poor's priority

SHABANA AZMI
talks to
Darryl D'Monte

Shabana Azmi – the winner of an unprecedented five National Awards for Best Actress in India, and an indefatigable campaigner for the poor – tells the story of how a Government programme trying to promote literacy in a village in a remote area of Uttar Pradesh ran into fierce opposition from its people. Finally a non-governmental organization (NGO) was called in to try to break the impasse.

'They gathered all of the women of the village and asked what their biggest problem was. In one voice all the women said "water",' says the actress who is also a nominated member of the upper house of India's parliament. It turned out that they had to walk miles for water because their handpumps had broken down, and the men of the village would not repair them. With the NGO's help they not only learnt to repair the pumps themselves but were soon installing them in other villages.

'The next year,' adds Shabana Azmi, 'the villagers came forward to embrace the literacy programme because their needs had first been addressed.'



PK Das

From top to bottom: Shabana Azmi campaigning; with Aruna Irani in *Saaz*, 1997; with Ranjit Chowdhry in *Fire*, 1996; with Prakash Dhotre and Mallika Prascad in *The Godmother*, 1999.

The importance of water

The actress says that this incident was the first time that she had grasped the importance of water. But, she adds, this was brought home even more forcefully to her when attending a rally in a village in Madhya Pradesh in 1989, part of the campaign against building a dam on the Narmada river.

'I saw at first hand what displacement is all about,' she says. 'Instead of managing water resources for the people, these resources were given away. And the rich alluvial land which belonged to the people was being fenced off for the project.

'The people in whose name these projects are being planned for the "greater common good" are being ridden over roughshod. In the last 20 years, however, the debate on alternatives to dams has begun.'

Land tenure

Much of her work has been with the Committee to Protect the Rights of the Homeless in Mumbai, where she lives, through which she champions both land tenure and sanitation in the city's slums.

'A slum is a slum not because of tin sheds, not because of the materials with which people have built their houses, but because the environment there has been degraded,' she explains. 'There is no infrastructure or civic amenities. The Government's policy has been to supply houses in slums and expect people to move into them. Instead, it is better to give them tenure over their land, not a free house.'

Sanitation, she says, is the Government's 'last priority'. She has herself given money from the $425,000 each MP is allowed to spend each year on public projects in his or her own constituency to build lavatories. But, she adds, this is not enough, any more than was merely providing handpumps in the Uttar Pradesh village. 'The problem is to maintain them. You have to create the atmosphere within a slum community where systems are in place to maintain toilets'.

Ironically Shabana Azmi was forced three years ago to give up shooting a film called Water, *directed by Deepa Mehta – which dealt with the plight of widows who had been abandoned along the Ganges river – after it was disrupted by Hindu fundamentalists. But she says that she has not been able to persuade many of her fellow actors to take up water issues.*

Mobilizing concern

'I don't think anyone in the film industry has really applied their minds to these,' she says. 'They are more concerned with social issues, like health and AIDS, which fall more easily within the purview of actors. I am on a parliamentary standing committee on rural development and I am working to mobilize MPs to show their concern' ■

Darryl D'Monte is President of the International Federation of Environmental Journalists.

Winfried Eberhard/UNEP/Topham

ATOMIC POWER

The simple union between two atoms, hydrogen and oxygen, has had an enormous effect on the Earth from the most remote beginnings of life. Even now it exerts its power over the destiny of every living being aboard our planet.

It abounds in such excess in some parts of the world that it is hated and feared. Yet, in others, it has always been so scarce that it is at the heart of daily prayers and considered a blessing of God.

Water is the thread that knits together the web of life. It purifies and keeps our bodies healthy, provides us with food, is home to millions of living creatures, regulates the global climate, dilutes pollutants, and sustains every country's economic wealth as the essential resource for our industries, agriculture and transportation.

RIGHTS AND RESPONSIBILITIES

We all have the same right to access the resources 'lent' to us by nature. But we are also all responsible for them, on behalf both of our present peers, and of future generations.

Despite being one of humanity's most precious resources, water is appallingly administered and badly taken care of by most of us. We waste it and pollute it. We take no care of its delicate ecosystems or of the other creatures whose lives depend upon it. It is also scandalous that, here in Latin America, the poorest people have to pay more for clean water than the rich who have publicly piped supplies.

OBLIGATION TO ALL

Facilitating access to this resource where it is not sufficient must be an obligation on each government, enterprise and citizen. We need more efficient irrigation techniques and wells, and better sanitary conditions. Though costly, the investment required is not huge compared to the benefits that flow with water. Political will, training and education are essential. The commercialization of water is all very well but, even so, municipal distribution, and investing in better technologies and processing plants, should be part of the business of government, particularly in cities and large urban concentrations. Governments must regulate the water companies to ensure compliance with the highest standards of safety and cleanliness for all their citizens. The companies must be required to treat all the water distributed prior to returning it to its source.

A DUTY TO OTHERS

As for ourselves, we the citizens have the greatest responsibility of all. We must not only compel our governments and corporations to make the provision of clean safe water for all their highest obligation: we must also put ourselves in the shoes of our poorest neighbours every time we turn on a tap – and consider what we, as a global family, are doing to help those who die every day for want of a drop of water ■

Alejandro Bisi

Marina Mansilla Hermann of Peace Child Argentina is a Student of Environmental Science at the Universidad Católica de Salta (Buenos Aires), Argentina.